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Assessment of engine's power budget for hydrogen powered hybrid buoyant aircraft

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Abstract
It is well known that **hydrogen** has less undesirable exhaust emissions as compared with other types of liquid fuels. It can be used as an alternative fuel for a **hybrid buoyant aircraft** in which half of the gross takeoff weight is balanced by the aerostatic lift. In the present study, weight advantage of liquid **hydrogen** as an ideal fuel has been explored for its further utilization in such **aircraft**. Existing relationships for the estimation of zero lift drag of airship is discussed with special focus on the utilization of such analytical relationships for the **aircraft** whose fuselage resembles with the hull of an airship. Taking the analytical relationship of **aircraft** and airship design as a reference, existing relationships for estimation of **power budget** are systematically re-derived for defined constraints of rate of climb, maximum velocity and takeoff ground roll. It is perceived that when the propulsion sizing for liquid **hydrogen** is required, then the presented framework for estimation of its **power budget** will provide a starting point for the analysis. An example for estimation of the **power** requirement is also presented as a test case. (C) 2016 National Laboratory for Aeronautics and Astronautics. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/by-nc-nd/4.0/>).

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